product information

Surface Solutions

Silicon Monoxide Patinal®

GENERAL INFORMATION

SiO is a commonly used material for a wide variety of applications with the emphasis on IR multilayer coatings and adhesion promotion. SiO sublimes and should preferably be evaporated from resistance heated boats.

AREAS OF APPLICATION

- Multilayer coatings especially for the IR, but also the VIS range
- Adhesion promoter (VIS, NIR)
- Electronics: dielectric, insulating and protective layers
- Design: iridescent coatings, colored metallically reflecting coatings e.g. on sun glasses
- Web coating: barrier layers on polymer films

THIN FILM PROPERTIES

The optical properties of layers made from SiO depend very much on the evaporation conditions (reactive oxygen, ion assistance) and the resulting oxidation state and layer structure.

	SiO	Si_2O_3	SiO_2
Range of Transparency	800 – 9000 nm	380 – 9000 nm	190 – 9000 nm
Refractive index	1.8 (1 µm), 1.6 (7 µm)	1.55 (500 nm)	1.46 (550 nm)
Dielectric constant	5 – 9	1.55	1.46
Dielectric loss (tan δ)	0.02 – 0.16	0.001 – 0.02	$0.6 – 1 \cdot 10^{-3}$
Resistivity	$10^7 – 10^{12}$ Ω cm	$10^{12} – 10^{16}$ Ω cm	10^{17} Ω cm
Color	Yellow / brown	Colorless	Colorless

EMD Electronics
The Electronics Business of Merck KGaA, Darmstadt, Germany operates as EMD Electronics in the U.S and Canada.

mail: photonicsUS@emdgroup.com / web: patinal.com

patinal®

NOTES FOR EVAPORATION

Evaporator source	Resistance heater thermal evaporation Electron beam evaporator
Boat / Liner	Molybdenum, tungsten, tantalum
Evaporation temperature	1200 – 1600 °C
Deposition rate	~ 0.8 nm/s (SiO), ~ 0.4 nm/s (Si_2O_3)
Oxygen partial pressure	< $2 \cdot 10^{-5}$ mbar (SiO), 1 - $3 \cdot 10^{-4}$ mbar (Si_2O_3)
QCR-settings	Density 2.13 g/cm³, Z-ratio 0.870

PRODUCTS

Product Code	Description	Purity*	Dimensions
1.07716	Silicon Monoxide Granules Patinal®	≥ 99.99 % (4N)	Granules, about 2 – 4 mm
1.10553	Silicon Monoxide Granules Patinal®	≥ 99.99 % (4N)	Granules, about 4 – 8 mm

* The purity values are based on the specified trace metals.

Appearance	
1.07716	Anthracite grey
1.10553	Anthracite grey

EMD Electronics
The Electronics Business of Merck KGaA, Darmstadt, Germany operates as EMD Electronics in the U.S and Canada.

mail: photonicsUS@emdgroup.com / web: patinal.com

patinal®

SPECIFICATION

Cobalt (Co)	≤ 0.0005 %
Copper (Cu)	≤ 0.002 %
Chromium (Cr)	≤ 0.001 %
Iron (Fe)	≤ 0.005 %
Vanadium (V)	≤ 0.0005 %

RoHS information

The RoHS compliance information is part of the Certificate of Analysis (CoA) for each batch of Patinal® material.

Sizes

1.07716	Granules 2- 4 mm ≥ 80 %
1.10553	Granules 4 -8 mm ≥ 80 %

Application test

Each batch has to pass a specific application test assessing its evaporation behaviour.

EMD Electronics
The Electronics Business of Merck KGaA, Darmstadt, Germany operates as EMD Electronics in the U.S and Canada.

mail: photonicsUS@emdgroup.com / web: patinal.com

Quality assurance

Research, production and sales of our Patinal® evaporation materials take place under a certified DIN EN ISO 9001 quality management system and DIN EN ISO 14001 environmental management system. The quality of the materials is assured by our manufacturing processes, in-process controls and quality tests. Each batch is released only after passing our chemical analysis and application tests designed to confirm the suitability of the material for the evaporation process.

Handling precautions

Product safety information required for safe use is not included in this document. Before handling, read product and safety sheets and container labels for safe use, physical and health hazard information. The material safety data sheet is available online at www.patinal.com, from your EMD representative or distributor, or by calling your global Merck KGaA, Darmstadt, Germany, contact.

Disclaimer

Products are warranted to meet the specifications set forth on their label/packaging and/or certificate of analysis at the time of shipment or for the expressly stated duration. EMD PERFORMANCE MATERIALS CORP. MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE REGARDING OUR PRODUCTS OR ANY INFORMATION PROVIDED IN CONNECTION THEREWITH. Customer is responsible for and must independently determine suitability of our products for its intended use and processes, including the non-infringement of any third parties´ intellectual property rights. EMD Performance Materials Corp. shall not in any event be liable for incidental, consequential, indirect, exemplary or special damages of any kind resulting from any use or failure of the products: All sales are subject to our complete Terms and Conditions of Sale. Prices are subject to change without notice. EMD Performance Materials Corp. reserves the right to discontinue products without prior notice.

EMD Electronics
The Electronics Business of Merck KGaA, Darmstadt, Germany operates as EMD Electronics in the U.S and Canada.

mail: photonicsUS@emdgroup.com / web: patinal.com